Unit 4
Day 4
Section 8.4
The Binomial Theorem

BINOMIAL COEFFICIENT

For non-negative integers n and r, with $r \le n$, the symbol $\binom{n}{r}$ is defined as

$$\binom{n}{r} = \frac{n!}{r!(n-r)!}$$

Using the TI-30X to calculate the binomial coefficient we use the nCr feature.

$$\binom{10}{7} = \frac{10!}{7!3!} = \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot 3 \cdot 2 \cdot 1} = 120$$

USE YOUR CALCULATOR TO DO THE FOLLOWING:

10 , PRB, ->, nCr, =, 7, = This should give you 120.

Evaluate.

1) $\frac{7!}{3!4!} = \frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{3 \cdot 2 \cdot 1 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 35$

2) $\binom{8}{3} = \frac{8!}{3!5!} = \frac{8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{3 \cdot 2 \cdot 1 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 56$

$\binom{8}{3} = {}_8C_3$

3) ${}_{100}C_2 = 4950$

$\binom{100}{2} = \frac{100!}{2!98!}$

BINOMIAL THEOREM

For any positive integer n and any complex numbers x and y,

$$(x+y)^n = \sum_{r=0}^{n} \binom{n}{r} x^{n-r} y^r$$

Refer to p. 603 for Binomial Theorem

USING THE BINOMIAL THEOREM

Write the binomial expansion for each expression.

4) $(p+q)^5$

5) $(x-2y)^6$

HOMEWORK

UNIT 4 DAY 4
P. 605-606: 2-26 (EVEN)